

Aquilegia

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The Exceptional Palaeobotany of Southern Colorado & the Demise of the Dinosaur

New CoNPS Website

Two New Lichen Species Discovered in Boulder!

Phenology (What Does It Mean?)

Jim Borland's Garden Natives

AND MORE!

Colorado Native Plant Society

Dedicated to furthering the knowledge, appreciation, and conservation of native plants and habitats of Colorado through education, stewardship, and advocacy

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AQUILEGIA: Newsletter of the Colorado Native Plant Society

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Aquilegia is the newsletter of the Colorado Native Plant Society. Members receive four regular issues per year (Spring, Summer, Fall, Winter) plus a special issue for the Society Annual Conference held in the Fall.

All contributions are subject to editing for brevity, grammar, and consistency, with final approval of substantive changes by the author. Articles from *Aquilegia* may be used by other native plant societies or non-profit groups, if fully cited to the author and attributed to *Aquilegia*.

The deadline for the Fall issue is October 1. Announcements, news, articles, book reviews, poems, botanical illustrations, photographs, and other contributions should be sent to the editor.

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AQUILEGIA: Newsletter of the Colorado Native Plant Society

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Register for the CoNPS Conference, Native Plants & Pollinators, and the Colorado Rare Plant Symposium online at <http://conps.org/volunteer/annual-meeting/>

You may vote in the CoNPS election at the Annual Conference. Bring your ballot. You may also email your votes to conpsturner@gmail.com

Two New Lichen Species Discovered in the City of Boulder Highlight the Importance of Habitat Conservation and Collaborations p. 12

Botanicum absurdum by Rob Pudim



CoNPS 2015 Annual Conference Update!

Register at <http://conps.org/volunteer/annual-meeting/>

There will be Two Native Plant Sales on Sunday, Sept. 13! Plant Lists on page 4

Have you been waiting for a native plant sale to purchase those not always easy to find native plants? The plant sale will offer locally grown plants from local seeds that are neonic-free. Two truly outstanding native plant nurseries will be represented.

Plant Sale: *Jim Tolstrup from High Plains Environmental Center* will offer plants grown at HPEC in the American Mountaineering Center Parking Lot on Sunday from 11 a.m. to 1 p.m. He is bringing a variety of native plants in 4" pots and 1 gallon pots. Over 30 species of perennials and 6 species of native grasses will be available. Pollinator gardens in a box will also be sold.

Plant Sale: *Mikl Brawner of Harlequin's Gardens Sustainable Nursery* will be offering a tour of his nursery and native plant sale at his nursery at 4795 North 26th St, in Boulder, about a 35 minute drive from the American Mountaineering Center. Harlequin's Gardens will be selling a selection of native plants for pollinators and also offers beekeeping supplies. See tour info below.

Field Trip Additions & Changes:

Red Rocks Park Field Trip - Jennifer Ackerfield's Red Rocks Park Field Trip filled quickly. In order for more people to be able to attend Jen's field trip, CoNPS presidents and authors of *Wildflowers of Red Rocks Park*, Jan & Charlie Turner, will serve as co-leaders.

Lookout Mountain Nature Center Field Trip - Meet at the AMC parking lot at 9:30 a.m. (not 8:30 a.m.) to carpool.

Keying Grasses & Other Plants at Green Mountain Field Trip - Loraine Yeatts of the Denver Botanic Gardens will help you key out grasses and other plants at Green Mountain near Golden. Loraine is the co-author of the *Alpine Flower Finder*. Loraine will contact you to let you know which books to bring. She will probably use Jan Wingate's grass key and your choice of floras (Weber & Wittmann's *Colorado Flora: Eastern Slope* or Ackerfield's *Flora of Colorado*).

Tour of Harlequin's Gardens Sustainable Nursery - Harlequin's Gardens has several mature demonstration gardens containing many native forbs and shrubs. None are watered more than once a week and some are never watered. The nursery has been selling natives since 1992. Located at 4795 North 26th St, in Boulder, about a 35 minute drive from the American Mountaineering Center. Mikl is offering tours of Harlequin's Gardens at 10 a.m. and 3 p.m. For carpooling, meet at 9:15 a.m. at the American Mountaineering Center parking lot for the 10 a.m. tour and at 2:15 p.m. for the 3 p.m. tour.

Book Signing by Jennifer Ackerfield

Copies of *Flora of Colorado* will be available for purchase from the Book Store and Jennifer Ackerfield will do a book signing on Saturday during the break from 10:20 -10:40 a.m. in the Conference Rooms on the lower level of the American Mountaineering Center.



Food Trucks at the American Mountaineering Center

In case you don't want to leave the fun at the Annual Conference to search for a place to eat, Food Trucks will be parked next to the American Mountaineering Center on Saturday at lunchtime. Choices are:

Simply Pizza - A selection of wood-fired pizza

Little India - Classic Indian dishes from Denver's well known Little India restaurant. Vegetarian options available.



See page 5 for Campgrounds & Carpooling & Guest Rooms Information

Two Huge Native Plant Sales @ the CoNPS Conference

Don't miss out on some great native plants for your yard. The plants are neonic-free.

There is very little duplication between the two lists so it is worthwhile to attend both plant sales.

Harlequin's Gardens is offering *Oenothera howardii* and many penstemons! HPEC has milkweeds and *Mentzelia decapetala*!

My Shopping List

Native Plants for Sale at Harlequin's Gardens

Allium cernuum - Nodding Onion
Aquilegia chrysanthra - Yellow Columbine
Aquilegia caerulea - Blue Columbine
Aster laevis - Smooth Aster
Berlandiera lyrata - Chocolate Flower
Callirhoe involucrata - Prairie Wine Cups
Campanula rotundifolia - Harebells
Dalea (Petalostemon) purpurea - Purple Prairie Clover
Engelmannia peristenia (Engelmannia pinnatifida) - Engelmann's Daisy
Eriogonum jamesii - James' Buckwheat
Eriogonum umbellatum Kannah Creek - Sulfur Flower
Erysimum capitatum - Wallflower
Gaillardia aristata - Indian Blanket Flower
Ipomopsis (Gilia) aggregata - Skyrocket; Scarlet Gilia
Liatris punctata - Dotted Gayfeather
Oenothera howardii - Howard's Evening Primrose
Oenothera macrocarpa - Evening Primrose
Oenothera missouriensis - Missouri Evening Primrose
Penstemon barbatus - Scarlet Bugler; Scarlet Penstemon
Penstemon cardinalis - Cardinal Penstemon
Penstemon clutei - Sunset Crater Penstemon
Penstemon eatonii - Firecracker Penstemon
Penstemon grandiflorus - Large Penstemon
Penstemon jamesii - James' Penstemon
Penstemon linarioides - Low Penstemon
Penstemon palmeri - Palmer's Penstemon
Penstemon pseudospectabilis - Desert Penstemon
Penstemon rostriflorus - Bridges Penstemon
Penstemon strictus - Rocky Mountain Penstemon
Thelosperma spp. - Navajo Tea
Ratibida columnifera - Mexican Hat; Prairie Coneflower
Zinnia grandiflora - Desert Zinnia

And over 25 native shrubs in 3 sizes including:

Amorpha canescens - Lead Plant
Amorpha nana - Dwarf False Indigo
Arctostaphylos (3 species)
Cercocarpus intricatus, C. ledifolius, and C. montanus - Mountain Mahogany
Chamaebatiaria millefolium - Fernbush, UT & ID (not CO)
Fallugia paradoxa - Apache Plume
Forestiera pubescens (F. neomexicana) - New Mexican Privet
Ribes - Currants

These plants will be for sale at the tours of Harlequin's Gardens in Boulder on Sunday, Sept. 13, at 10 a.m. and 3 p.m.

Native Plants for Sale - High Plains Environmental Center

Achillea lanulosa - Yarrow
Antennaria anaphaloides - Pearly Pussytoes
Antennaria parvifolia - Pussytoes
Asclepias incarnata - Swamp Milkweed
Asclepias tuberosa - Butterfly Milkweed
Aquilegia chrysanthra - Yellow Columbine
Aquilegia caerulea - Blue Columbine
Dalea purpurea - Purple Prairie Clover
Erigeron speciosus - Aspen Daisy
Erigeron vetensis - Early Bluetop Fleabane
Galium boreale - Northern Bedstraw
Gaillardia aristata - Blanket Flower
Echinacea angustifolia - Narrow-leaf Coneflower
Helianthus maximiliani - Maximilian Sunflower
Heterotheca villosa - Golden-aster
Liatris punctata - Dotted Gayfeather
Linum lewisii - Blue Flax
Mentzelia decapetala - Starflower
Mirabilis multiflora - Desert 4 O'clock
Monarda fistulosa - Beebalm
Penstemon grandiflorus - Large-flowered Penstemon
Penstemon strictus - Rocky Mountain Penstemon
Penstemon virgatus - One-sided Penstemon
Ratibida columnifera - Mexican Hat; Prairie Coneflower
Ratibida pinnata - Pinnate-leaf Prairie Coneflower
Rudbeckia hirta - Black-eyed Susan
Rudbeckia laciniata - Cut-leaf Coneflower
Sedum lanceolatum - Lanceleaf Stonecrop
Sidalcea candida - White Checkermallow
Solidago canadensis - Canada Goldenrod
Stanleya pinnata - Prince's Plume
Thermopsis divaricarpa - Golden Banner
Verbena hastata - Blue Swamp Verbena
Yucca glauca - Soapweed Yucca

Grasses

Andropogon gerardii - Big Bluestem
Bouteloua curtipendula - Side-oats Grama
Deschampsia cespitosa - Tufted Hair Grass
Panicum virgatum - Switch Grass
Spartina pectinata - Prairie Cordgrass
Sorghastrum nutans - Indian Grass

Most of the plants in this list were grown from seeds from Larimer County

These plants will be for sale on Sunday, Sept. 13, from 11 a.m. to 1 p.m. in the parking lot at the AMC.

Campgrounds Near Golden

Bear Creek Lake Park

15600 W. Morrison Road, Lakewood, CO

303-697-6159

<http://www.lakewood.org/Camping/>

Approximately 8.5 miles from the American Mountaineering Center in Golden

Chief Hosa Campground

27661 Genesee Dr. (exit 253 from I-70)

303-526-1324

<http://chiefhosa.org/>

Approximately 12 miles from the American Mountaineering Center in Golden. This is the only campground that is up in the mountains.

Clear Creek RV Park

1400 10th St, Golden, CO 80401

303) 278-1437

<https://rec.cityofgolden.net/wbwsc/webtrac.wsc/wbsplash.html?wbp=3>

Less than ½ mile from AMC (just down the street from it along the creek)

Jefferson County Fairgrounds

15200 W. 6th Ave., Golden, CO

303-271-6600

<http://jeffco.us/fairgrounds/campground/>

Approximately 5 miles from the American Mountaineering Center.

Stanley Lake Regional Park

100th Ave. and Simms St.

303-425-1097

<http://www.ci.westminster.co.us/ParksRec/Parks/>

StandleyLakeRegionalPark/Camping.aspx

Approximately 12 miles from the American Mountaineering Center in Golden

Carpools

If you are interested in carpooling to the Annual Conference, please contact Jan L. Turner (JLTurner@regis.edu) for a list of people from your area who will be attending the Conference.

Carpool drivers should be paid 40 cents per mile split among the passengers. For example, for a 100 mile round trip, the driver should be compensated a total of \$40 by the passengers. Please bring cash to pay your driver.

Guest Rooms

If you are in need of a place to stay in the Golden/Denver area while you are attending the Annual Conference, please contact Jan L. Turner (JLTurner@regis.edu) so she can check if anyone in the Golden area has a spare guest bedroom.

News & Announcements

Aquilegia in TAXON

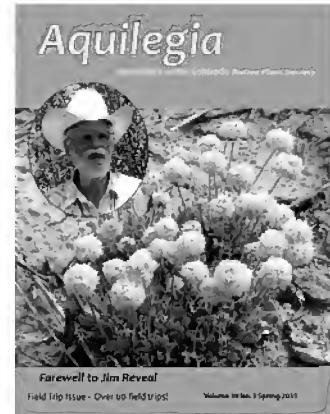
Aquilegia was mentioned in Rudolf ("Rudi") Schmid's "Reviews & Notices" column of *TAXON: The International Journal of Plant Taxonomy*. 64(3):670. See excerpt from *TAXON* below:

Aquilegia, a gem of a newsletter (CoNPS) edited by Jan Turner Rudolf Schmid, UC

With its summer 2013 issue (vol. 37, no. 3) *Aquilegia: Newsletter of the Colorado Native Plant Society* (CoNPS, Box 200, Fort Collins, CO 80522; [www.conps.org](http://conps.org)) entered a new dimension of excellence. That was the first issue Jan L. Turner edited after retiring as a professor and reference librarian at Regis University in Colorado.

Jan produces a colorful and newsy *Aquilegia* (ISSN 21620865 print, ISSN 21617317 online), 8.5 × 11" (216 × 279 mm)-format, five times a year: spring, summer, annual meeting, fall, and winter. See <http://conps.org/category/newsletters> for past issues.

The "field trip issue" of spring 2015 (vol. 39, no. 1) is 32 pages! Besides news of field trips, workshops, other society activities, current books and media, gardening, and profiles of vegetation, plants, and sometimes animals (e.g., coyotes in fall 2013), *Aquilegia* informs about amateur and professional botanists, as revered taxonomist James Lauritz Reveal (29 Mar. 1941–9 Jan. 2015) in 39(1): 3–5 [Noel H. Holmgren's tribute reprinted from *Nevada Native Pl. Soc. Newslett.* 41(1): 3–7, 2015].



National Seed Strategy

As part of a science-based strategy to address the threat of wildfires that are damaging landscapes across the West, the U.S. Department of Interior announced (on August 17) the release of a National Seed Strategy for rehabilitation and restoration to help foster resilient and healthy landscapes.

The Strategy, developed in partnership with the Plant Conservation Alliance and the U.S. Department of Agriculture, is meant to guide ecological restoration across major landscapes, especially for those lands damaged by rangeland fires, invasive species, and severe storms and droughts. The Strategy is in place to put emphasis upon the importance of planting appropriate seeds to help grow plant life and pollinator habitat, which are critical natural defences against climate change.

Read more on the CoNPS website, <http://conps.org>, or at http://www.blm.gov/wo/st/en/prog/more/fish_wildlife_and/plants/seedstrategy.html

News & Announcements Continued on Next Page

News & Announcements

Flora of Colorado is in Print!



Photo © Don Neumann

The dream has become a reality. *Flora of Colorado* by Jennifer Ackerfield has been published by BRIT (Botanical Research Institute of Texas) Press.

Jen posted on her Facebook page, "I can't believe I'm actually holding the first copy of my book! 20 years of botanizing all wrapped up in this book right here."

The book can be purchased from BRIT Press at <http://shop.brit.org/products/coloradoflora> or you can purchase it from the CoNPS Bookstore.



On the evening of June 26th in Fort Collins, Colorado State University celebrated the publication of Jen's book with a soiree held on the lawn outside the Anatomy/Zoology Building. After a



casual dinner, attendees gathered to hear Jen talk about the book and to thank those who helped her with their expertise, and those who helped contribute funding needed to print the book. The talk was followed by tours of the herbarium.



Botanical experts, Bill Jennings and Carolyn Crawford, attended the Soiree. Bill encouraged Jen to write the *Flora of Colorado*. Carolyn Crawford, Bill's wife, is a well-known botanical artist.



Right:
Jennifer
Ackerfield
in her native
habitat, the CSU
Herbarium.



Left: Dr. Miriam Denham donated her personal collection of over 20,000 specimens to the CSU Herbarium.

Photos in this article by Jan Turner except where noted.

Some of the money generated by the sale of the *Flora of Colorado* will help in funding an endowment for the CSU Herbarium.

If you would like to make donations to the CSU Herbarium, contact Jen Ackerfield at jrowens@colostate.edu

Meet CoNPS' New Membership & Marketing Coordinator: Dr. Jen McGuire Bousselot

Greetings from Centennial, Colorado.

My name is Jennifer McGuire Bousselot and it is my honor to serve the Colorado Native Plant Society as the Membership and Marketing Coordinator. The unifying themes of my career have been plants, volunteers, and technology. My journey began on a small family farm in eastern Iowa where I helped in my mother's gardens and my father's fields. I attended Iowa State University for a B.S. in plant health



Jen McGuire Bousselot

and protection and a M.S. in sustainable agriculture. Then my husband and I moved out to Colorado in 2003 where I became the Horticulture Agent for Colorado State University Extension in Douglas County and managed a large Colorado Master Gardener volunteer program.

One of my volunteers worked at the EPA Region 8 headquarters in Denver and he invited me to advise on species selection for a green roof that was being planned for their new building. I became so involved that by 2007 I was back in school, this time at Colorado State University, where I researched plant species suitability and substrate blends on the EPA green roof.

Bousselot (cont. on page 8)

James A. Erdman, Plant Ecologist

(1935-2015)

by Chris Neufeld-Erdman

James Allen Erdman, a member of the Northern Chapter of CoNPS, was born December 20, 1935 in Milwaukee, Wisconsin, to Robert and Esther Erdman. He died peacefully on February 4, 2015 at his mountain "hermitage" high in the Rocky Mountains near Red Feather Lakes, Colorado. He'd fought a brief struggle against mesothelioma, cancer of the lining around the lungs. He was 79.

In the early 1960s, Jim was a member of the Wetherill Mesa archeological team that helped expand Mesa Verde National Park (near Cortez, Colorado) to include some of the most remarkable ancient Pueblo cliff dwellings, including the famed "Long House". There he completed his research in botany and earned a PhD in plant ecology from the University of Colorado, Boulder. Later, he taught at Fort Lewis College, Durango, Colorado, until he became a geobotanist for the United States Geological Survey in Lakewood, Colorado, a position he held until he retired in the 1990s.

Jim's scientific research contributed to non-invasive and more environmentally friendly techniques for mineral exploration, the control of noxious weeds in prairie ranch lands, and the management of wetlands and other natural resources. Inspired by chief mentors, Bill Weber and John Marr, Jim was a pioneer in his field, presenting his research in the Soviet Union, China, Scandinavia, and at symposiums across North America.

A writer, activist, and provocateur, Jim was deeply concerned about the environmental challenges before us. He contributed generously to political causes he felt would contribute to the flourishing of the natural world. In later years, he combined a keen understanding of natural science with insights drawn from history and anthropology in order to address the cultural and political mistakes he felt certain are leading us toward disaster. His final paper, "A Sketch of Three Cultures—Past, Present, Future—Weld County, Colorado" (2013) focused on the interaction between the natural world and its human inhabitants and directly challenged the threat posed to both by the fracking industry. He concluded that paper with a quote from an unknown author, typical of his outlook: "The human spirit needs places where nature has not been rearranged by the hand of man."



Dr. Jim Erdman, Sacquoy Head, north coast of Rousay, Orkney.

Photo courtesy Chris Neufeld-Erdman

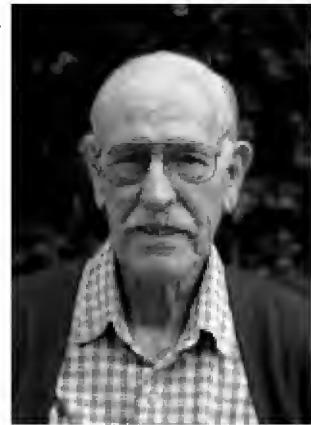
Jim was above all a naturalist, in love with the all things wild and wonderful. Only months before his death, he was still climbing fourteen thousand foot peaks, and curating nature walks at the Soapstone Prairie Natural Area in the wilderness north of Fort Collins.

Dr. Chris Neufeld-Erdman, Jim's son, is Minister/Teacher/Head of Staff, Davis Community Church, Davis, CA <erdmanc@gmail.com>

Robert ("Bob") Thorne (1920-2015)

Noted plant taxonomist, Robert ("Bob") Folger Thorne, passed away March 14, at age 94. Thorne was Curator Emeritus of the Rancho Santa Ana Botanic Garden Herbarium and Professor Emeritus, Claremont College.

He graduated from Dartmouth College and received his PhD in Economic Botany from Cornell University.



Thorne's research focused on the evolution of flowering plants and he developed the Thorne system (1992) of plant classification. In 2000, he published a new classification system for the monocots and in 2001 for the dicots.

In the "Plants Systematics World" column of the May 2015 issue of *TAXON*, Lucinda McDade, Executive Director of the Rancho Santa Ana Botanic Garden, stated:

Together with Arthur Cronquist and Armen Takhtajan, Bob Thorne formed a triumvirate of botanists who grappled with the monumental task of sorting out relationships among all angiosperms in the years just before the advent of phylogenetic methods and DNA data. Bob's 1992 publication in *The Botanical Review*, "Classification and geography of the flowering plants", is a citation classic.

Bob was also keenly interested in biogeographic patterns among plants; his 1972 paper in *Quarterly Review of Biology*, "Major disjunctions in the geographic ranges of seed plants", is also widely known and cited.

A third major interest was in floristic of western North America, with emphasis on California. His Flora of the higher elevations of the Sierra San Pedro Martir, Baja California, Mexico, was published in *Aliso* in 2010.

A celebration of Thorne's life was held at RSABG on July 11th.

References:

McDade, Lucinda. (2015) In Memoriam: R.F. Thorne. The American Society of Plant Taxonomists website. April 12, 2015. <http://www.aspt.net/news/2015/04/13/in-memoriam-r-f-thorne#>. VZNHv03bLIU

Robert Folger Thorne from Wikipedia https://en.wikipedia.org/wiki/Robert_Folger_Thorne

Thorne, R.F. (1992). "Updated phylogenetic classification of the flowering plants". *Aliso* 13: 365–389.

Thorne, R. F. 2001. Classification and geography of the flowering plants: Dicotyledons of the class Angiospermae (subclasses Magnoliidae, Ranunculidae, Caryophyllidae, Dilleniidae, Rosidae, Asteridae, and Lamiidae). *Botanical Review* 66(4): 441–647.

Thorne, R. F. 2000. The classification and geography of the monocotyledon subclasses Alismatidae, Liliidae and Commelinidae, pp. 75–124. In B. Nordenstam, G. E-Ghazaly, and M. Kassas [eds.], *Plant Systematics for the 21st Century*. Portland Press, London, UK.

Thorne, R.F. 2000. "The classification and geography of the flowering plants: dicotyledons of the class Angiospermae". *Botanical Review* 66 (4): 441–647. doi:10.1007/BF02869011.

Thorne System (1992) in Wikipedia. [https://en.wikipedia.org/wiki/Thorne_system_\(1992\)](https://en.wikipedia.org/wiki/Thorne_system_(1992))

Bousselot (cont. from page 6)

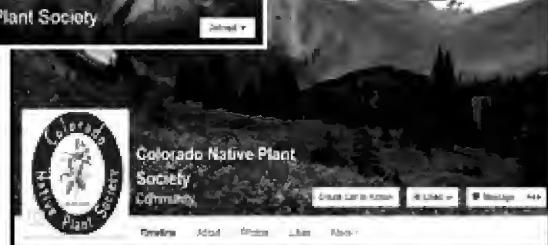
After I completed a doctoral degree in horticulture, we returned to Iowa where I was hired as the State Master Gardener Coordinator at Iowa State University. As native Iowans we dutifully tried to return to our homeland but the pull back to Colorado was too strong. Since our return to Colorado, I have become affiliate faculty in the Department of Horticulture and Landscape Architecture at Colorado State University where I teach classes part time online and on campus. I am an Editorial Advisory Board Member for the *Journal of Living Architecture* and I am a volunteer for the Denver Botanic Gardens at Chatfield.

You will be hearing from me every couple of weeks with the latest CoNPS E-News. I will be tweeting on Twitter and I'll be posting events on the new CoNPS Facebook Community page. We also have our original CoNPS Facebook Public Group page, where people post photos of plants and other people (often Jim Borland or Jen Ackerfield) identify the plants. I look forward to working with all of you to promote the mission of the Colorado Native Plant Society.

Please contact me with your ideas for sponsors for CoNPS, the membership drive, events, to volunteer, or with your questions. My email is conpspromote@gmail.com.



Left: CoNPS Facebook Public Group Page



Right: CoNPS Facebook Community Page

New Denver Chapter President

Samantha "Sam" Clark is the new president of the Metro Denver Chapter. Samantha is a biologist who enjoys conducting botanical and ecological surveys, special status species surveys, wetland and other waters of the U.S. delineations, biological/environmental assessments and creating mitigation/restoration plans and specifications. Samantha is originally from the midwest and moved to the west in 2002. Samantha lives in Denver with her two sons.



Sam has partnered with Nicole Marcisz in leading MeetUp hikes to introduce local hikers to CoNPS.

Sam succeeds Jannette Wesley and Jeanne Willson as the President of CoNPS. See page 6 for an article on Wesley & Willson.

New Southeast Chapter President Is Ready for CoNPS Annual Conference

The Southeast Chapter welcomes Richard Bunn as their new chapter president. With his butterfly net in hand, Richard was inspired by the theme of the CoNPS 2015 Annual Conference: Native Plants & Pollinators to check out the pollinators on the native plants in his area.



Richard Bunn Photo © Bill Maynard

A retired Army civilian wildlife biologist, Richard first became interested in botany when he took dendronology courses at Stephen F. Austin University in eastern Texas. He soon became obsessed and traveled across the western United States looking for all of the species listed in Little's *Checklist of United States Trees*. Other than being "detained" while sneaking around the Mexican border while stalking the elusive *Bursera fagaroides*, he found the trip to be pretty much a success. The Mexican

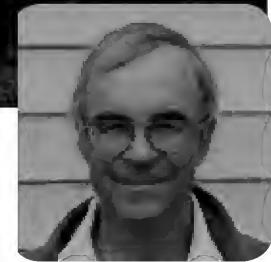
Southeast Chapter (cont. on p. 10)

Check Out the New CoNPS Website! CoNPS.org



New Website, New Way of Doing Business

CoNPS has a new website that can be updated by numerous volunteers at the blink of an eye. Thanks to the efforts of Mo Ewing, CoNPS Treasurer, Conservation Chair, and now also Webmaster, the CoNPS website is now replete with beautiful wildflower photos and is hosted by WordPress so it can be updated quickly and easily without a knowledge of coding. In the past, the website has been labor-intensive and we had a number of webmasters, all excellent, who put in a huge number of hours to maintain the CoNPS website. These included Sara Hill, Al Schneider, Yongli Zhou, Aaron Davenport, and Sally Dunphy. It became obvious that it was unfair to ask these volunteers, most of whom had full-time jobs, to put in the number of hours required to update the website.



Mo Ewing

The arrival of the new website provides additional opportunities for change. With a guarantee of an up-to-date website and social media tools, time-sensitive items such as the chapter events (programs and field trips) and workshops will be shared with CoNPS members via the website, email, other electronic media. *Aquilegia: The Newsletter of the Colorado Native Plant Society* will be able to focus on articles and more in-depth news items. Future plug-ins for the website will help with management of membership files and allow members to attend to many things, such as sign up for field trips and workshops through the website eventually.

Jannette Wesley & Jeanne Wilson: A Dynamic Duo Retires

Jannette Wesley and Jeanne Willson are stepping down as the Co-Presidents of the Metro Denver Chapter of CoNPS. Please let them know how much you appreciate their hard work. They made sure that the chapter had a great selection of programs and field trips.



Jannette Wesley
Jannette invited members of the Denver Chapter to her house annually for pot lucks/field trip planning sessions and was a leader when the Denver Chapter put on a very successful Annual Meeting.

Jannette became president of the Metro-Denver Chapter of CoNPS in 2010. Vickie Trammell had been the previous president. The Metro-Denver Chapter hosted the Annual Meeting that year, so Jannette served on the Annual Meeting Committee, putting on a successful meeting held at the Tivoli Center at University of Colorado, Denver. The theme that year was Colorado Collage.

Jannette retired from the National Park Service where she worked as a Technical Information Manager (librarian, records manager, and project manager). Since she retired she has been able to devote more time to CoNPS, botanizing, leading

hikes, and travel. She also cares for her elderly mother.

Jeanne Willson joined Jannette as her co-President in 2013, attending the CoNPS Board meetings as the representative of the Metro Denver Chapter.



Jeanne Willson

Jeanne Willson has led field trips focusing on the plants of Castlewood Canyon and on conifers. She has offered overnight camping trips accompanied by her singing and ukulele, guitar, and fiddle music. In addition to botany, Jeanne loves canoeing, paleontology, and music. Jeanne has a doctorate in botany from Cornell University, where she studied toxic plants and their effects on livestock. She teaches short courses at the Denver Museum of Nature and Science in botany and paleobotany.

Although they are no longer in their role as CoNPS Metro Denver Chapter Co-Presidents, Jannette and Jeanne will remain active in CoNPS.

Samantha Clark is the new president of the Metro Denver Chapter.

Congratulations, Sara!

Sara Copp, Chair of the E & O Committee, is now working for Terracon Consulting as an Environmental Scientist. She will be consulting for threatened and endangered species on project sites; performing wetland delineations; and evaluating how proposed projects may impact the natural resources of a site including impacts to rare plants and animals, migrating birds, noxious weeds, wetlands, and rivers.

Congratulations also to Sara and Pete Franz on their marriage on June 20 at Snow Mountain Ranch in Granby, CO.

Brian Kurzel Moves to NWF

Congratulations to former CoNPS Board member, Brian Kurzel, who has accepted a job with the National Wildlife Federation (NWF) as the Regional Executive Director for the Rocky Mountain Regional Center. Brian stated, "It's a great opportunity and I will continue to fight for the protection of the West's habitats, species and landscapes in my new role."

When Brian first became active in CoNPS, he was employed by the Colorado Natural Areas Program and next moved to Colorado Parks & Wildlife.

Coming Next Year:

Landscaping with Colorado Native Plants Conference

Will take place Saturday, March 12, 2016
at The Ranch Events Complex, McKee Building (Loveland)
More details to follow.

The conference is presented by a partnership of:

Wild Ones - Front Range Chapter, Butterfly Pavilion, Colorado Native Plant Society, CSU Extension Service, CSU Native Plant Master Program, Denver Botanic Gardens, Front Range Sustainable Landscaping Coalition, High Plains Environmental Center

For more information, contact Susan Smith at
Susan@TheHabitatGardener.com.

Hike Leaders - Check if you need a Permit!

Did you know that you might need a permit to lead a wildflower hike in a park, even if you are not charging the participants? That's right! Many parks require permits or at least their approval if you want to lead wildflower hikes in their parks. Even though CoNPS is a non-profit organization and you are leading a free hike as a volunteer, a free permit may be required.

Myrtle Spurge Pull at Spruce Gulch 9/12

Myrtle Spurge Spruce Gulch 2.0 (Volunteer Project), 8 am - 4 pm. Spend a beautiful day in Boulder with other volunteers helping to rid the state of the noxious weed Myrtle Spurge. Lunch provided. No experience necessary. Minimum Age 16 (accompanied by an adult). To sign up go to www.wlrv.org and select "Current Project Schedule" or call Morgan (303) 543-1411 X 3#

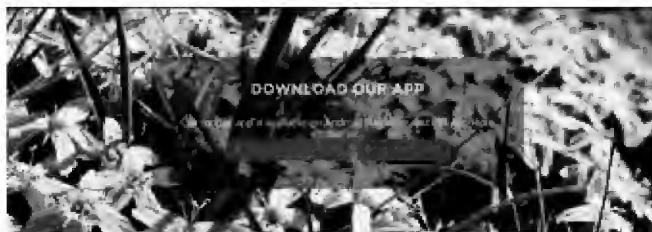
Southeast Chapter - Richard Bunn (cont. from page 8)

authorities let him go once he was determined to be mostly harmless.

Through most of his career he worked with one species or another of wildlife, from musk ox and bears to butterflies and lizards, but primarily birds (MBTA/DODPIF), and endangered species. He also worked a few years as a botany technician in Alaska and Colorado. After a few thousand Daubenmire frames, his romance with botany waned and he realized that this was no way to earn a living.

In the last few years of his career, he devoted a lot of time to mapping barrens endemics on Fort Carson. Now that he is retired and can do whatever he wants, his time is pretty much evenly divided between chasing plants, insects, and birds.

Citizen Science App



New Alpine Plant app: ID plants and help with research at the same time!

After a year-long collaborative project at the University of Colorado, Boulder, Environmental Studies PhD student Nathalie Chardon and INSTAAR post-doc Jane Smith along with a group of Computer Science undergraduate students recently launched the Luminous ID app (luminousid.com). This app serves as a general alpine plant field guide and can also recognize the alpine cushion plant *Silene acaulis*. The field guide currently consists of flowering plants occurring on Niwot Ridge at CU's Mountain Research Station. While using the app for field identification of alpine plants, you can also help research efforts to map *S. acaulis* across its extensive range. The identification algorithm encoded within the app immediately tells you if you've taken a picture of *S. acaulis*, and this information is uploaded to a server along with GPS coordinates of your location. Coupled with climate and topographical data, the data generated from this citizen science project will be invaluable in answering questions about the distributional constraints on this species.

Science Talk: Colorado Honeybees

August 27, 6:00 to 7:30 pm. at the Butterfly Pavilion. Free Lecture preceded by appetizers and wine and beer; Butterfly Pavilion: 6252 W. 104th Avenue, Westminster, CO 80020.

National Wildlife Federation's Rocky Mountain Regional Center and the Butterfly Pavilion are teaming up to bring you the latest news on Colorado's honeybees and the impacts of colony collapse disorder. Join them and Beth Conrey, President of the Colorado State Beekeeper's Association and owner of Bee Squared Apiaries for this lecture. This event is free, but space is limited. Pre-registration is required. Contact Kamla Sullivan at 303-441-5150 or atsullivan@nwf.org or learn more at <http://www.butterflies.org/learn/science-talks>

Annual Seed Swap and Plant Sale

Saturday, September 19, 2015; 9 to 11 am

Butterfly Pavilion, Westminster, CO

Joint event of Colorado Native Plant Society and Front Range Wild Ones

Come to our plant sale and seed swap and pick up some new Colorado native plants for your garden! In addition to seed, we invite you to donate any "extra" plants from your garden for a fundraiser to benefit both organizations. This event is open to members of either the Colorado Native Plant Society or Front Range Wild Ones. (If you're not a member, you can sign up with either organization at the event.)

Our host this year is the Butterfly Pavilion. Amy Yarger, the Butterfly Pavilion's Horticulturist, will give us a tour of the habitat garden that has been specifically designed to attract butterflies and other beneficial insects. We'll also visit the neighboring open space where Amy (along with volunteers) has been working to restore the short grass prairie and riparian habitats. Refreshments will also be provided.

Directions to Butterfly Pavilion from Denver. <https://goo.gl/maps/45a1A>

Directions to Butterfly Pavilion from Boulder <https://goo.gl/maps/4I5DL>

How does a Seed Swap work?

Basically, bring any seed you've collected from your yard and take a similar amount from what is offered. All seeds should be from species native to Colorado.

What if I don't have any seeds or plants to share?

Please come anyway! We always have plenty of seeds and plants, and you can consider a small donation to either organization if you find some seed you can use. Plus, you'll have a great time touring the garden and open space!

How do I prepare my seed?

1) Please bring your seed in a paper bag or envelope (one bag/envelope per species). Label the envelope with the botanical name, common name, size, flower color, and any other helpful growing tips. For example:

Liatris punctata, Dotted gayfeather

1 to 2 feet tall, purple spikes in August-October.

Prairie plant with very long tap root.

2) To take seed, use the blank seed envelopes and paper bags provided to take a portion of the seed you want. Be sure to write the label information on the seed envelope.

How do I donate a plant?

The plant sale is a fundraiser for the Colorado Native Plant Society and Front Range Wild Ones. Plants will be sold for \$1 to \$5 each; however some plants will be available at no cost. Simply bring any volunteer natives potted in a nursery pot or similar container. Label the pot as above. Don't forget to water and keep the plant alive until the sale! Please RSVP using the form on the website, <https://frontrangewildones.wordpress.com/calendar/> by September 12th and let us know if you are bringing seeds or plants. Thank you!



Discovery Garden, Butterfly Pavilion
Photo by Amy Yarger

HPEC Fall Plant Sale

Loveland, Saturday, Sept. 19

HPEC grows ecotypic plants from seed, mostly collected in Larimer county and use no neonics or pesticides of any kind. Their prices are low and proceeds from the sales promote HPEC's environmental education. You may order pollinator gardens. For information, contact Jim@suburbitat.org

Welcome Back, Carters!

We are excited to welcome Jack and Martha Carter back to Colorado. The Carters are active environmentalists, botanists, and authors, who spent over 20 years in Silver City, New Mexico, after retiring from their jobs in Colorado Springs. Jack is professor emeritus, Colorado College, and the author of *Trees & Shrubs of Colorado* and *Trees & Shrubs of New Mexico*. Martha was a teacher in Colorado Springs and is a co-author, with Jack Carter and Donna Stevens, of the book, *Common Southwestern Native Plants: An Identification Guide*. Both Carters have been very active members of the Native Plant Society of New Mexico (NPSNM) during their years in Silver City and established the Jack and Martha Carter Conservation Fund.

The Carters are advocates for botany education in schools and donated many copies of *Trees & Shrubs of Colorado* to Colorado schools to help promote botanical and environmental education. They are members of the Metro Denver Chapter of CoNPS. We look forward to their presence at CoNPS Board meetings, offering their advice and insight gained through many years of experience with the NPSNM.

Jack Carter will be staffing the CoNPS booth at the Colorado Association of Science Teachers Conference on November 20 at the Denver Mart. He will be handing out free copies of his book, *Trees & Shrubs of Colorado*, for use in the classroom. If you are interested in volunteering with Jack, contact Sara Copp, Chair, E & O Committee at src715@gmail.com.

News & Announcement Continued on page 13

Compliments to the Collections Managers:

New Species of Lichens from Boulder Honor Tim Hogan & Dina Clark (COLO Herbarium)

by Erin Tripp



Above: Dina Clark
Left: Tim Hogan

To say that good colleagues are worth their weight in gold drastically misses the mark, but so too will most language that I might devise to convey the importance of such individuals. Words are of course best left for poets, but how can we trust them to write about the people that matter to us the most?

I landed in Colorado two and a half years ago – in a gray, mid-morning blizzard in late February of 2013. Not a flower in sight to welcome me, but only the sounds of

silence except for a perennial river and a raven. I was hoping for a long, content, and productive existence in my new home state. I knew Colorado was special—really special: the plants, the lichens, the bedrock, the watersheds, the fissures that cut through the plains: all of them insufficiently studied and underappreciated by the rest of the world. Finding beauty in the outdoor verse was never difficult for me, and Colorado made this especially easy.

As for most field biologists, finding beauty in the indoor verse comes second. Too much sitting, not enough standing. Crowded

spaces with few windows and little light. The sardine routine – we do it well in the University of Colorado Herbarium – especially our specimens, which are packed tightly against their casings. Reasons to complain about the indoors can add up if you let them: our building that houses a world class collection of 550,000 irreplaceable objects is sinking slowly into Boulder Creek, and the 84°F days that we log in August surely do not agree with museum specimen preservation. But, these negatives are easily counterbalanced by the positives: day after day of thrilling discoveries in stacks of collections far more alive than any of us realize, the constant buzz of a herbarium in use by professionals, students, amateurs, or other natural history enthusiasts, and the occasion of working with two of the nation's BCMEs: Best Collections Managers Ever.

The University of Colorado Herbarium (affectionately and officially: COLO) employs long-term Collections Managers Tim Hogan and Dina Clark. Tim began his career in the herbarium in 1985. As a young and intrepid cragsman and explorer of the Southern Rockies, Tim had no notion that his love of literature, poetry, and wilderness would mingle so intimately with his intellectual curiosity of the natural world and lead him to one day top the unofficial list of most skilled botanists of our great state of Colorado. Joining him at the top of this list is Dina, a fireball of a human being whose career as a botanist was perhaps an obvious and inevitable extension of her fervor for life and the living world around her. Dina began working at COLO as a graduate assistant in 1992, and her contributions pile on faster than any of us can keep up with. Many CoNPS *Aquilegia* readers know Tim and Dina well, and those who do are nodding their heads.

Enter White Rocks Open Space – a City of Boulder Open Space and Mountain Parks (OSMP) 100-acre preserve, near the eastern city limits. In 2013, Lynn Riedel of OSMP approached Dina and myself about conducting a vascular plant (Dina) and lichen (me) inventory of the remarkable urban sandstone outcrop that characterizes White Rocks. Meanwhile, Megan Bowes of OSMP was working with Tim to help facilitate his vascular plant inventory of a different OSMP preserve just down the road: the Boulder Mountain Parks. White Rocks is part of the Fox Hills Sandstone formation, which stretches from Alberta to Kansas and was deposited during the retreat of the western interior seaway in the late Cretaceous. The biological significance of White Rocks relates in part to geological and climatological histories as well as degree of preservation. But, as importantly, White Rocks represents a unique and intact native habitat within what has become a sea of urban development.

I wasn't sure what to expect. Here was this tiny preserve in the middle of an urban landscape. Yet, it is one that rests atop a unique geology that is little represented in the Front Range Mountains. It had also never before been surveyed lichenologically. I ended up documenting 57 species of lichens in this 100-acre parcel of land. Most of the species were not exceptionally rare globally, but many were conspicuously rare locally given the paucity of exposed, soft sandstones in our area. Of the 57, I was unable to

put names on four of them. Two of these species intrigued me immediately and I set to working through their taxonomy within hours of collection. Both turned out to be new species to science. Not only were they undescribed but they were also incredibly rare: as far as I could discern, neither were yet represented in the COLO Lichen Herbarium – one of the best in western North America. I studied both in detail with colleague James Lendemer of the New York Botanical Garden. Following extensive anatomical, morphological, and molecular investigation, we eventually described these two new entities as *Lecidea hoganii* and *Candelariella clarkiae*, honoring the careers of Tim Hogan and Dina Clark in the herbarium. The remaining two oddities are still under investigation and may represent species of *Acarospora* and *Lecanora* new to science.

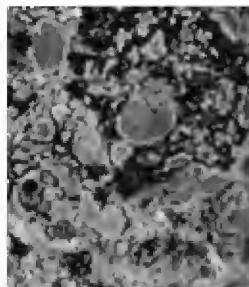
City life almost always gets me down. Traffic, the smart phone disease, consumerism, and Sunday retail therapy...all of which I loath to admit I am part of, but it's true (except the smart phone part). Yet, dreams of flying Cessnas into subalpine muddy airstrips aside, the Front Range of Colorado is a pretty sweet place to have landed. Finding hope, progress, and new species in tiny urban reserves is an immediate lift, higher than a Cessna 180 can achieve over the Great Divide, and highlights both the ecological and humanistic significance of green spaces worldwide. Keeping an open mind as we residents of Colorado promise to do, I am reminded that cities are refuges for microbreweries, new maple tree cultivars, amazing string quartets, and, as it turns out, botanical surprises—both outside and inside. Hear, hear to green spaces, herbaria, and collections managers nationwide!

Erin A. Tripp

University of Colorado, Boulder

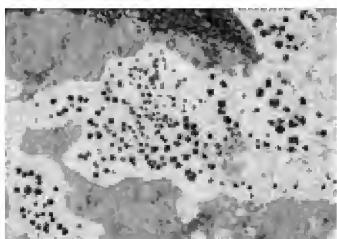
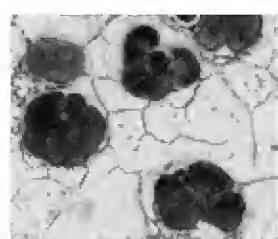
Curator of Botany (COLO Herbarium), Museum of Natural History

Assistant Professor, Department of Ecology & Evolutionary Biology



Candelariella clarkiae

More information about the lichens of White Rocks can be found in Tripp 2015a ("Lichen inventory of White Rocks Open Space [Boulder, Colorado]; *Western North American Naturalist*"), Tripp 2015b ("*Candelariella clarkiae* and *Lecidea hoganii*:



Lecidea hoganii

two lichen species new to science from White Rocks Open Space, City of Boulder, Colorado; *The Bryologist*), and Tripp, in press (*A Field Guide To The Lichens Of White Rocks Open Space*, University Press of Colorado, Boulder). Erin thanks Tim, Dina, and the numerous other collections managers whose work is so important yet sometimes underappreciated. Erin is also indebted to Lynn Riedel, Megan Bowes, and the City of Boulder's Open Space and Mountain Parks Program for all they do to support research and conservation of invaluable green spaces.

Note: We have other amazing staff at COLO, not the least of which is Ryan Allen, our Biodiversity Information and Digital Resources Project Manager, and our beloved student assistants including Vanessa Diaz, Breanna Leinbach, Melissa Smithson, and Joseph Kleinkopf. We invite you to come see the new species of lichens and say hi to our staff. But please make an appointment.

Photos in this article by Erin Tripp (lichens), Luke Tembrook (Tim Hogan), and courtesy Denver Botanic Gardens by Scott Dressel-Martin (Dina Clark).

Erin will be leading a lichens field trip as part of the CoNPS Annual Conference on Sunday morning, Sept. 13.

News & Announcements (cont. from p. 11)

Southern Rockies Seed Network Volunteer and Training Opportunities

CoNPS is proud to support the Southern Rockies Seed Network (part of the new non-profit, Synergy Ecological Restoration) by promoting their events and trainings. This is a great chance to botanize while collecting native seeds and cuttings, and to get out into new off-trail areas you may not otherwise visit. Take a look at the projects and trainings below, and visit the website (www.synergy3.org) or contact Erica (erica@synergy3.org) for the full schedule for the year, questions, or to sign up.

August 29th, 8am-1pm: Native Plant Materials Collection (location TBD)

September 9th, all day: Native Plant Materials Collection (Mt Evans!)

Sept 10-11th, all day: Ecological Restoration Skills and Leadership Training (location TBD in Larimer County)

Native Plant Master Classes

Wildflower Seed Collection and Sowing, Sept. 19, 1-3 p.m. Free

Webinar: Native Lookalikes to Noxious Weeds, Nov. 3 12-1 p.m. \$10

To sign up: <http://www.eventbrite.com/o/csu-extension-native-plant-master-program-metro-to-mountain-group-1715901818>

Colorado State BeeKeepers Association Conference

Healthy Bee/Bee Healthy October 1-3

Millennium Hotel, Boulder, Colorado

<http://coloradobeekeepers.org/western-apicultural-society-was-meeting/>

News & Announcements Cont. on page 15

The Lakes at Centerra: Environmental & Economic Interests Working Together

by Jim Tolstrup

On a warm afternoon a tiger swallowtail butterfly rests on the orange-pink flower of a swamp milkweed (*Asclepias incarnata*). Native bumblebees lumber awkwardly, slowly, seemingly contented as they lazily sample each flower on the stalk of the side-bells penstemon (*Penstemon secundiflorus*), under the warm summer sun.

As young ospreys test out their fragile wings, slowly gaining strength, a pair of western grebes run across the surface of the lake performing their ancient, miraculous dance. This is not the wilderness, national park, or even a carefully "preserved" natural area. This is habitat that was intentionally designed and built in the midst of a rapidly growing neighborhood, The Lakes at Centerra in Loveland.

The concept for this neighborhood, which features "nature in your backyard" as a major marketing piece, is the result of a unique collaboration between a non-profit (High Plains Environmental Center - HPEC), a developer (McWhinney), builders, businesses and residents. Soon, a K-8 public school with a STEM focus (Science, Technology, Engineering, and Math) will be added to the mix. Students will be able to utilize the adjacent environmental center, comprised of 275 acres of wetlands, as a "living laboratory".



The result of this symbiotic relationship between economic and environmental interests provides a hopeful vision for conservation in the 21st century focused not on conserving wild places that already exist but on restoring habitat for wildlife within the neighborhoods that we design and build.

The Lakes neighborhood will consist of 791 units, including single family homes, townhouses and apartments, spanning 300 acres, as well as scores of acres of restored open space and community parks. The development began as an agricultural field, portions of which were weedy and abandoned. One section contained a junk yard with a century of accumulated waste, including an entire railroad car (See photo below). The area was substantially regraded, creating wetland drainages throughout the neighborhood.

The result is a large scale constructed wetland habitat, spanning more than 20 acres in phase one, which has been seeded with native grasses arranged in zones according to soil moisture. Sedges and rushes will emerge from wetland micro pools, which will remain open water year round. The saturated soils above the wet pools contain native tallgrass species such as Big Bluestem - *Andropogon gerardii*, Yellow Indian Grass - *Sorghastrum nutans* and Switch grass - *Panicum virgatum*. The higher dryer portions of the open space support short grass species including Blue grama - *Bouteloua gracilis*, Sideoats grama - *Bouteloua curtipendula* and Western Wheat Grass - *Pascopyrum smithii*.



Gregory Holman, a restoration ecologist with USDA-ARS and an HPEC board member, says; "You can have mosquitos in concrete drainages that hold as little as a quarter inch of water. The difference in these ponds is that here you also have tadpoles, predatory insects and other biological controls that help to regulate mosquito populations while supporting a wide range of wildlife species in the midst of development."

Since 2006, Centerra has been focused on creating storm water ponds, vegetated with native plants that replicate the ecological function of wetlands, providing wildlife habitat and purifying runoff. In 2008, the document *Centerra Guidelines for Natural Areas and Stormwater Drainage*, won an environmental stewardship award from the American Society Landscape Architects. The document was the result of collaboration between Ark Ecological Services, BHA (a landscape architecture firm), McWhinney and HPEC.

Historically the site was high plains grassland dominated by short grasses and shrubs. In 1907, the lake that lies at the heart of HPEC was dug. Known as "Equalizer" this reservoir is part of a working irrigation system and is used for moderating the levels of other reservoirs in the Greeley Loveland Irrigation Company system. A second reservoir, named "Houts", was dug to the north of Equalizer for John Houts, the great, great grandfather of Chad and Troy McWhinney, the developers of Centerra.

When the McWhinneys brought their plan for the 3000-acre development to the City of Loveland, the City stipulated that the development would be 20 percent open space at build out. McWhinney hired an environmental consulting firm (Cedar Creek) to do an assessment of environmentally sensitive areas. The study identified setbacks surrounding the two reservoirs, based on existing vegetation. The setbacks that resulted from this study became the foot print of what would become the HPEC. Tom Hoyt, the president of McStain Neighborhoods, suggested creating a stand-alone 501(c)(3) to become the recipient of the land. McWhinney readily embraced the idea and voluntarily imposed an environmental assessment fee which is collected by the City when building permits are issued for projects within Centerra, west of 1-25. The accumulated "environmental assessment fees" will grow to an endowment of four- million dollars by the build out of Centerra.

The use of native plants in residential landscaping blurs the line between restored habitat in open space and backyard gardens. The design guidelines for the neighborhood actively encourage homeowners to utilize native and xeric plants as well as native lawns.

As an additional source of revenue, the environmental center manages open space for the Centerra Metro District and other

land owners. HPEC also grows native plants from locally collected "eco-types." The native plants are used for landscaping within the neighborhood and in restoration projects. The proceeds from both the nursery and

open space management programs fund the center's public outreach and environmental education programs.

HPEC is in the process of constructing the visitor center located within The Lakes at Centerra Neighborhood. The visitor center is scheduled for completion in August 2016. For more information visit www.subabitat.org

Jim Tolstrup is the Executive Director of the High Plains Environmental Center and Chair of the CoNPS Horticulture Committee.

HPEC Native Plant Sale!

The High Plains Environmental Center will have a plant sale on Saturday, September 19th. Their address is 2868 Bluestem Willow Dr, Loveland, CO 80538. Order your native pollinator garden! Native plants from HPEC will also be available for purchase on Sunday, September 13, from 11 a.m. to 1 p.m. in the parking lot next to the American Mountaineering Center at the CoNPS Annual Conference.

News & Announcements (cont. from page 13)

America's Grasslands Conference: Partnerships for Grasslands Conservation

will take place Sept. 29 – Oct. 1, 2015, in Fort Collins. It will bring together natural resource professionals, ranchers, policy experts, conservationists, and researchers to discuss the conservation of North America's grasslands, with a particular focus on collaborative partnerships to conserve grasslands. This year's conference will feature over 60 speakers, optional field trips to explore local grasslands with experts, roundtable discussions on timely issues related to grassland conservation, a poster session on cutting edge research and projects, and much more. Topics at this year's conference will include: success stories of partnership efforts to conserve grasslands, maintaining healthy grasslands for grazing, grasslands in federal policy, landscape level planning for grassland conservation, grassland-dependent wildlife, prairie pollinators, and many more exciting topics. Registration is \$185 if you register by Sept. 10th. To find out more about the conference or register, visit the website <http://www.nwf.org/What-We-Do/Protect-Habitat/Healthy-Forests-and-Farms/Americas-Grasslands-Conference/Registration.aspx>

The Southern Rockies Seed Network Annual Seminar and Meeting, December 3, 2015

This will be a day- long event held at the Loveland Ranch with a keynoter and speakers in the morning, lunch on your own, and partner and board meetings in the afternoon.

Timberline Gardens to Close

Denver area gardeners and native plant lovers are very sad because Timberline Gardens will close on September 30th. The garden is known for their wide selection of plants including a number of cacti and native plants grown by Kelly Grummons. The Denver Botanic Gardens at Chatfield will be the new home of Kelly's large collection of cacti. Kelly will be staying in the Denver area and continuing his column in Jane Shellenberger's excellent publication, *The Colorado Gardener*.

Using 2014 Farm Bill Programs for Pollinator Conservation

USDA Biology Technical Note No. 78, 2nd ed., May 2015

"Protecting and creating habitats for native bees and honey bees also supports an array of beneficial insects, such as butterflies, moths, flies, beetles, and wasps..." Read more online at

http://plants.usda.gov/pollinators/Using_2014_Farm_Bill_Programs_for_Pollinator_Conservation.pdf

More News on Page 22

The Exceptional Paleobotany of Southern Colorado and the Demise of the Dinosaurs

by Ed Roland

Most of us are aware of the famous quarries near Canon City, Colorado, that have populated natural history museums around the world with the structural skeletons of fossilized dinosaurs.

But how many of us know that a region spanning the border between southeastern Colorado and northeastern New Mexico is one of the world's most scientifically important "hotspots" for fossilized plant life?

Paleobotanists research plants of the distant geologic past, and they've had plenty to study within a couple hundred miles or so (by road) from Pueblo and Colorado Springs.

Plant fossils, just as exceptional in their own way as those of the dinosaurs, have provided a picture of a Colorado on the shore of a gigantic Cretaceous Inland Seaway where brackish, calm and relatively shallow warm water slowly ingressed over the mid-section of our continent starting about 100 million years ago (mya).

These geologic time periods are, admittedly, incomprehensible to short-lived mortals like us. But the evidence for the plant life that flourished here in the "future Colorado" so long ago is captured in an extensive fossil record. (Like the dinosaur bones, many of these fossils have been removed and supplied to museums.)

Virtually any paleontology text includes a discussion of how fossils are, in reality, exceptionally rare. Just the right conditions must exist for the preservation of even hard, calcified elements like bones, shells and other persistent anatomical structures. Soft tissues -- like leaves and flowers -- tend to easily dissipate, so the fossil record is strongly skewed toward the "durable."

That's why there are very few fossilized plant locales in the world with 1. enough diversity of plant species along with the quality fossils needed to i.d. them, and 2. fossils that represent a long enough geologic timeline that something like a real ecological history can be reconstructed.

The area in southeastern Colorado -- part of the Raton Basin -- more than satisfies the "exceptional" designation for a number of reasons. But first and foremost is that the botanical fossil record spans the extinction event that wiped out the dinosaurs and a large percentage (about 75%) of other life on earth.

Many extinction theories have been proposed, but the 1980 hypothesis submitted by Walter and Luis Alvarez, describing an approximately 10 km diameter asteroid slamming into the Yucatan peninsula, has predominated to the point of general acceptance. The botanical fossil record in southeastern Colorado and northeastern New Mexico is a scientifically critical part of the reason why.

This fossil record begins about 68 mya -- a period known as the "Late Cretaceous," when angiosperms predominated. For the area in southeastern Colorado, the fossils provide evidence for a pre-impact climate, and plant life, that was decidedly sub-tropical. Near the water's edge, palms with fronds often greater than eight foot across rose over 100 ft. into the sky, with many smaller understory plants growing up to the shoreline and often right into the water. (Most paleoecologists seem to believe the water was saline, but to a much lesser extent than today's sea water.)

Paleobotanists have also determined little evidence of growth rings in woody plants of the area, indicating year round growth without true seasonality. This makes sense since the equator was significantly closer to where Colorado is today.



Artist rendering of pre-impact plant life in southeastern Colorado.

Subtropical and tropical species like many figs and magnolias, and even representatives of breadfruit (*Artocarpus*) and an early banana (*Canna*) have left behind exceptional fossils.

On higher, dryer ground, grapes (Vitaceae), olives (Oleaceae) and the ancestors of hardwoods (like oaks, walnuts and maples) thrived, with scant evidence of conifers. An important exception is a fossilized sequoia that some paleobotanists consider to be an early ancestor of the California Redwood (*Sequoia sempervirens*). If the physiology of sequoias is consistent with today's modern species, the conclusion is that these uplands were often the recipients of early morning fogs or mists from the Cretaceous Seaway.[1]

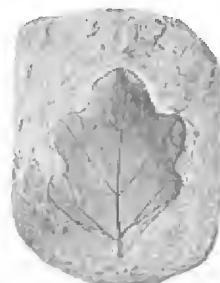
An analysis by paleobotanists Jack A. Wolfe and Gary Upchurch of this area shows a dramatic change in the "before and after" plant life.[2] The evidence of the impact in the geological record, known the "K-T Boundary," is a generally less than 1 cm line in the strata with debris containing iridium from a space object along with tiny melted shards of quartz constituting fallout from the massive explosion.

(The K-T Boundary itself was first discovered in non-marine strata by a group of scientists from the Los Alamos National Laboratories and the U.S.G.S. in 1981. The discovery proved so significant that, in 1984, the Smithsonian Institute removed for display a multi-ton chunk of rock with the K-T Boundary intact from an exposure near Starkville, Colorado. Since then, the boundary has been found in non-marine strata around the world.)



2- *Sequoia obovata* Knowlton - a probable ancestor of the modern day California Redwood, *Sequoia sempervirens*.

This was only possible because -- unlike dinosaurs, mammals and insects -- plants are stationary organisms. In the fossil record, they are the evidence of the atmospheric conditions, temperature, humidity, available light, and the other environmental conditions in which they grew. This allows geologists to use them as "index fossils" to help identify depositional formations and strata.

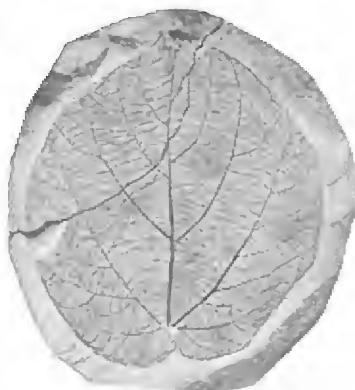


3 - *Quercus rockvalensis* Knowlton - a very minimally lobed early oak.

Much of the evidence presented by Wolfe and Upchurch consisted of high quality and detailed fossils of leaves. Wolfe had pioneered an innovative approach of correlating what he called "leaf physiognomy," i.e., shapes, veins, stomata, cuticles and edges to their climatic function (e.g., leaf tips were correlated to rain) rather than relying on phylogenetic relationships.

The other essential part of the story was in the microfossils. Fern spores and angiosperm pollen, called "palynomorphs," are reasonably durable structures that are abundant in the fossil record. Other supporting research in the area has shown that, before the impact of the asteroid, fern spores accounted for 22 - 36% of palynomorphs from several species. However, in the layer above the K-T Boundary, deposited after the asteroid, a single species came to dominate to the extent that > 99% of the palynomorphs were fern spores from that species.[4]

The conclusion was obvious: after the impact, estimated at 65 mya, much of the existing plant life could not survive the cataclysmic conditions. Ferns, which require less light for photosynthesis and can quickly multiply by means of both spores and rhizomes, were pioneer species that thrived and predominated until the atmosphere began to clear. Eventually, angiosperms once again established dominance and evolved well into the following Tertiary Period and, of course, up to today.



4.- *Ficus leei* Knowlton - an early ancestor of the modern ficus.

Why should we concern ourselves with the fossilized evidence of these plants which lived so long ago? Besides their critical role as index fossils, here are just a few other reasons:

1. The geological record is based on the widely accepted concept of "uniformitarianism." This implies that our current period is just the latest phase in a consistent process of change. So understanding the climatic and geological past is essential for predicting the climatic and geological future.
2. These plants are essential components of the phylogeny of modern day plants. Some, like the equisetums and gingkos, are little changed compared to their fossilized ancestors. Many others have a strong family resemblance -- such as acers (maples), magnolias and juglans (walnuts) -- to modern species.
3. These plants were the basis of the food chain when they lived and photosynthesized, just as plants are today. Without them, modern organisms could not have evolved.
4. As these plants thrived and died, they sequestered megatons of CO₂ in the form of dead and compressed vegetation. Thanks to plants from this specific geologic period, along with the foraminifera, corals, bivalves and the like which used carbonates to build their structures, CO₂ declined and the percent of oxygen in the atmosphere rose to allow for the evolution of mammals -- us humans for example.
5. Since carbon reacts with oxygen to produce energy, these plants -- compressed over time into coal -- have had a significant economic impact on southern Colorado and northern New Mexico. For example, the steel mill in Pueblo was dependent



5 - *Sabal inquira* Knowlton. Many of these large palm fossils were left in situ because they were simply too large to remove from the strata without destroying.

Darwin said the sudden appearance of angiosperms in the fossil record is "an abominable mystery." Flowers, an entirely new reproductive system, appear to be the product of a relative burst of evolutionary change -- an example of what the paleontologist Steven Jay Gould has called Punctuated Equilibrium. There are a number of proposed explanations for this reproductive revolution [5] (see Taylor, Taylor & Krings for a complete run-down), but a probable contributing factor was the need for plants to become more efficient reproducers through pollination as their CO₂ advantage gradually diminished.

References:

- [1] Ash, Sidney R., and Willam D.Tidwell 1976. "Upper Cretaceous and Paleocene Floras of the Raton Basin, Colorado and New Mexico," 27th Conference Field Guide Book of the New Mexico Geological Society, p. 200
- [2] Wolfe, J.A., and G. R. Upchurch, Jr. 1987. "Leaf Assemblages Across the Cretaceous-Tertiary Boundary . . ." *Proceedings of the National Academy of Sciences*, 84:5096-5100 [22]
- [3] Ibid
- [4] Nichols, Douglas J. and Kirk R. Johnson 2008, "Plants and the K-T Boundary," Cambridge University Press, p.109.
- [5] Taylor, Thomas N., Edith L. Taylor and Michael Krings, 2009. "Paleobotany, the Biology and Evolution of Fossil Plants," 2nd ed., Academic Press, pp, 877-897

Illustration / photo captions:

Illustration / photo credits:

- [1] Ash and Tidwell, p. 201, drawing by Paul H. Smith

- [2], [3], [4] and [5] Lee, Willis T. and F. H. Knowlton, 1917, U.S.G.S. Professional Paper 101

Ed Roland is the former president of the Southeast Chapter.

dent on the coal mines west of Trinidad, Co.

A note about flowering plants: Based on my research, there are no flowers in the fossil record of this area. As might be expected, flowers are even more rare than botanical elements such as leaves, stems, woody parts, etc. However, as indicated above, evidence abounds in the form of fossilized pollens. Paleobotanists have become quite expert in comparative palynology, i.e., the study of pollens and spores.

News from the Board

In May 2015, the Board voted to create the new part-time, one year position of Membership and Marketing Coordinator. The M & M Coordinator would be responsible for increasing membership in CoNPS and marketing CoNPS through outreach activities, advertising, and social media. The person hired would also help recruit and organize volunteers for projects and facilitate communication within the Society. A number of extremely well-qualified people applied for the position and, from that group, the search committee selected Dr. Jennifer McGuire Bousselot. CoNPS members will become familiar with Jen through her CoNPS e-Newsletter that will be distributed by email twice a month to members, updating them on CoNPS news and activities. *Aquilegia: Newsletter of the Colorado Native Plant Society* will still be published five times per year including the Annual Meeting issue but the E-News will satisfy the need to receive time-sensitive news quickly. It is hoped that through increases in membership and fundraising, the M & M coordinator position will continue to be funded beyond the first year and become permanent.

Payment for workshop leaders will increase from \$50 plus a \$25 gift certificate to \$200.

Non-members of CoNPS who complete one full course (3 days) in the Native Plant Master Program will be eligible to receive the CoNPS student membership rate for one year if they join CoNPS within one month of completion of their NPM course.

The Board approved the purchase of directional signs by the Workshop Coordinator and of a canopy to use at events for the Education and Outreach Committee.

In August, the Board was asked to provide a letter of support for the High Plains Environmental Center and the Board voted yes. The Board was also asked to formalize CoNPS' collaboration with the Native Plant Master® Program in writing; the wording is being revised for review at the October 24 Board meeting.

The Southern Rockies Seed Network is holding their 2nd Annual Conference on December 3rd and are requesting sponsors. The Board voted to sponsor the conference at the \$50 level.

Charlie Turner is working on a revision of the field trip waiver form and will consult with CoNPS' insurance company about the appropriate wording. He also wishes to form an ad hoc field trip standardization to prepare for an online field trip form on the website. His request was approved.

The next CoNPS Board meeting will be held on October 24.

Conservation Corner

Adopt-a-Trail Program: The Phenological Adventures of Mo Ewing

A few years ago Linda Smith hatched the idea of creating an "Adopt-a-Trail Program". The idea was that we would organize volunteers to go out on their favorite trail and collect information for the bloom times of the plants they saw. It wasn't a very rigorous scientific methodology but it was a cute idea. Get people off their cellphones and out into mother nature.

The big problem we had at the time was what to do with the "data" that we collected. We wanted to have an on-line database in our website to keep the data. Even though our website wasn't set up for it at the time, we hoped that our webmaster would eventually be able to create one. In 2012, we actually signed up several volunteers, but the program faded into the sunset because of the lack of an online database.

This year, however, being older and much wiser, we decided to get serious and do the program right. We visited Mary Goshorn at the Denver Botanic Gardens because we heard that she had set up a phenology program there. Mary, being a more serious researcher than us had set up the program through the National Phenology Network (<https://www.usanpn.org/>), a nationwide program to track the phenology of plants. The program "Nature's Notebook" (https://www.usanpn.org/natures_notebook) tracks about 3,000 species of plants all across the US using citizen scientists. The goal for 2015 is to complete 1.5 million observation records.

When we looked closer, we realized how simplistic our original Adopt-a-trail idea was. Here was a beautifully organized program, with all the instructions, plant ID tips and field forms ready to go. Depending on the plant, the field form was different and observations collected phenological data from the whole life cycle of the plant, not just bloom time as we had planned. For instance for chokecherry (*Prunus virginiana* ssp *melanocarpa*) you make observations on "breaking of leaf buds", "presence of leaves", "increasing leaf size", "colored leaves", "falling leaves", "flowers or flower buds", "open flowers", "fruits", "ripe fruits" and "recent fruit or seed drop". You answer each question "yes" or "no". This is important because you are providing negative data, which is very useful to researchers. If you want to get very geeky about it, you can even estimate what percent of the plant is in each stage of development.

But what we liked best about the program is that the data collected would be really useful to research scientists and would be universally disseminated. When we do develop our own database, expand the program to other species and store the data on our site, we can simply download all of the data we collect into NPN.

"Lets do it!"

But there were many questions. How many of the 3,000 species tracked by NPN were found in Colorado? Would we find them on trails we picked? Did we have to tag the individual plants we were studying in order to find them? How difficult were the procedures? And most important, would it be a drudge, or would it be fun?

Linda and I decided that we would do a pilot program. She would play the country mouse and do a trail up on Devil's Backbone in Loveland and I would play the city mouse and do part of the Highline Canal in Denver.

So on April 3rd, I headed out to the Highline Canal, a section between Holly and Yale streets, which I had walked twice a week since 2002 when I first came to Denver. At that time I had compiled a list of about 70 species I saw along the canal. I downloaded the 236 species for Colorado from NPN and headed out. There were some species I knew well and knew where they were (sort of). One of my favorites that I wanted to track was showy milkweed (*Asclepias speciosa*), a gorgeous plant that I loved and that was on the list. It wasn't up yet. But right next door I discovered mountain snowberry (*Symphoricarpos oreophilus*). What a find! Two natives! And then a third: chokecherry (*Prunus virginiana*). A bit further down pinon pine (*Pinus edulis*); all on the list.

Then I hit the exotics: dandelion (*Taraxicum officinale*), Tatarian honeysuckle (*Lonicera tatarica*); then the exotic invasives: common buckthorn (*Rhamnus cathartica*), Siberian elm (*Ulmus pumila*), Russian olive (*Elaeagnus angustifolia*); then the Class B noxious weeds! leafy spurge (*Euphorbia esula*).

What a horror show! Oh well, I thought, they are all real plants. And they are essentially natives now. Don't be a snob. They were all on the list, so I put them on my list.

And then I did find a few real Colorado plants. One sad looking rubber rabbitbrush (*Ericameria nauseosa*) and two huge plains cottonwoods (*Populus deltoides*) and a couple of domestics, alfalfa (*Medicago sativa*) and common lilac (*Syringa vulgaris*). So that

answered one question: plenty of species on the list to study. There were more, but I didn't want to make this a full-time occupation.

I went back home and printed up my data sheets and came back out the next day to start my data collection. Now, you must understand that I cannot be called a botanist. I consider myself a plant ecologist (where and with whom plants live), not a botanist because, let us say, I am a bit weak on plant morphology. And I had not really looked that closely at the various stages of plant phenology. And remember, it was at the beginning of the season. I am pretty good with my Weber and Wittmann when conversing with a plant in full bloom, but not so great when leaf buds are just breaking out.

I did OK with the snowberry: "leaves are out", "leaves are increasing in size", everything else, "no". The Siberian elm had all of the above and some leaf buds just breaking out, maybe 20%. But then I got to the pinon pine. "Yes" or "no": emerging needles? Where do they emerge from? That thing at the end of the branch? Or is that the beginning of a cone? And then when I get further along in the season, what is the difference between a "pollen cone" and a "seed cone". I was stumped. Whoever was crazy enough to study the phenology of pinon pines, anyway? I had truly never thought about it. I decided I would calm down and just watch and see what happens as the season progresses.

Then I got to the leafy spurge. "Initial growth" was done, check. It had leaves, check. What are those little things coming out of the leaf axles? Buds? Not sure. Put that on hold (ie, write in pencil).

My mountain snowberry had "breaking leaf buds", "leaves" and "increasing leaf size" and "flowers or flower buds". Good, that was easy.

My two plains cottonwoods had flower buds opening up before the leaf buds. That's interesting! I never noticed that about cottonwoods before, flower buds before leaves.

And so it went. The only plant in bloom were the dandelions.

Another question answered though was that it was easy to identify where the plants were. The Russian olive was "right behind the house with the skateboard ramp in the back yard", the leafy spurge was "in the alfalfa patch along the curb, 3rd big cottonwood north of Yale". I had so many plants, though -18 in all - that it helped to draw a little map so that I didn't miss

any.



Euphorbia esula: is this flower or fruit?



Pinus edulis: Where are those new needles?

On April 11 it was clear that the "little things coming out of the leaf axils" on my leafy spurge were flowers. But, boy, were those weird flowers! I hadn't the faintest idea what the parts were. In the following weeks I noted that more flowers sprouted out from underneath the sepals (I guess) of the older flowers. But the big problem I'm having now is deciding when the flowers turn to fruits. What do the fruits on spurge flowers even look like? Google images are no help. We'll see....

On April 19th, I was happy to see that my mountain snowberry was beginning to bloom. Oh, no, something's not right! Those aren't snowberry flowers, they're honeysuckle flowers! Lesson learned: it is very hard to tell the difference between a honeysuckle and snowberry when all they have is immature leaves. I am now tracking four Tatarian honeysuckles. Someone at the National Phenology Network probably thinks I have a honeysuckle fetish.

On the 19th, my plains cottonwoods are acting strangely. They seem to have different color catkins. Over the next couple of weeks the answer presents itself. One is a girl and the other a boy! They are dioecious! Never knew that about cottonwoods. By now the male catkins are all gone and the female ones have a string of plump seeds hanging down. I guess I cannot say those seeds are "ripe". I'll mark them "ripe" when the little parachutes pop out.

After that first week with the dandelions, I would never see any flowers, but would also see new seed heads. Those dandelions go through their whole blooming cycle in less than a week. My showy milkweeds came up on April 19, and are doing just fine. By May 2, my pinons still haven't started growing new needles.

Last week I couldn't get out to see my children because of the rain and snow. I wonder how well they survived?



Rhamnus cathartica: Those are flowers?

Anyway, entering the data is easy because the on-line forms are laid out exactly the same as the paper forms.

And you want to know something? I thought that this project might be a drag. I was doing it only to be able to tell people how the program worked. But it really has been fun even for a morphologically-challenged plant ecologist. Those plants do really interesting things....if we take the time to look.

Linda and I would love to have a couple of more volunteers to help pilot some trails. It is not too late in the season to start because often the plants need to be mature enough for you to identify them; and then next year you will be able to start the phenology observations on your plants from the "initial growth" stage.

The email is copsoffice@gmail.com. I'll help you set up your trail.

Postscript: When I went back after the week of storms in May to check on my plants, the *Ulmus pumila* didn't make it.



My poor *Ulmus pumila*.

Photos in this article © Mo Ewing

Mo Ewing is Chair of the Conservation Committee, Chair of the Finance Committee, the creator of the new CoNPS website, and the new Webmaster. In other words, Mo Ewing is a true superstar of CoNPS.

Phenology - Nature's Calendar

by Mary Goshorn

Phenology is the study of the timing of seasonal changes in living things. These changes are affected by day length, temperature, and precipitation. Because of this influence by climatic changes, phenological phases are easily observable indicators of climate and are an invaluable tool for climate scientists. These data are also used in agriculture to determine the best time to collect seeds, before insect damage has occurred, and to avoid collecting mature weed seeds. Farmers use these data to optimize the timing of planting and harvesting crops, when to apply pesticides without harming pollinators, etc.

Changes in the timing of seasonal events can be challenging for species that depend on one another. Bird eggs hatch when insects are available for the hatchlings to eat. Insect emergence coincides with leafing out of their host plants. Plants' bloom time is matched to pollinator adult stages. Not all species react the same way, in the same direction, or to the same degree, to changes in climate, so sometimes mismatches occur. A disjunction in the timing of these important relationships can have large impacts on the reproductive health of the species involved – timing matters.



Cornus sericea (redosier dogwood), Phenophase: Ripe fruits

Photo credit: Jen Toews

Phenology observations are as old as human history. Earliest humans would have used observations of plant and animal growth stages in making hunting and gathering choices. The Chinese have collected phenological records at least as far back as 974 BC. Lewis and Clark recorded phenological observations on their famous expedition. Anywhere people and other living things interact (i.e. everywhere!) people are, consciously or not, noting seasonal changes in those living things.

Denver Botanic Gardens now partners with two national phenology groups: Project BudBurst, with whom we collect phenology data on ten species at the Gardens; and the USA National Phenology Network (USA-NPN), with whom we designed our Phenology Trail (three sites, 15 species, 64 individuals) in conjunction with Nature's Notebook, the citizen science interface of USA-NPN. In 2007 the USA National Phenology Network (USA-NPN) was formed to standardize and centralize the data collected nationwide. The USA-NPN <https://www.usanpn.org/> now collects data on more than a thousand species, and has developed a framework for interested organizations to develop their own phenology trails.

We started our Phenology Trail in 2013 with the opening of our first Phenology Walk at our York Street location. This Walk is one of three that now comprise our Phenology Trail [www.botanicgardens.org/phenology-trail](http://botanicgardens.org/phenology-trail). The remaining two Walks were established in 2014, at our Chatfield location and the Mount Goliath location on Mount Evans. The Mt. Goliath alpine location is managed in collaboration with the US Forest Service. These varied locations capture more phenological variation than a single site would. Through collaborations with other partners we hope to expand our Trail around the state in coming years.

In addition to the data our volunteers regularly collect at all three Walks and report to Nature's Notebook https://www.usanpn.org/natures_notebook, the Walks offer an opportunity for the public to learn about phenology and to practice collecting information on targeted individuals, with the goal of encouraging people to continue collecting and reporting data from their back yards, neighborhood parks, hikes, etc. There is even a mobile app to download from the Nature's Notebook website, so you can collect data and submit it in the field to the database, no further steps necessary!

Don't be intimidated by this endeavor. There are many common species to track and each phenophase, for each particular species, is defined in very clear language on USA-NPN's website and on their species-specific datasheets, available for download. They also have a new Botany Primer online chock full of information to help observers make reliable plant observations https://www.usanpn.org/files/shared/files/USA-NPN_Botany-Primer.pdf with a glossary at the back to help define vocabulary used in the phenophase descriptions.



Martha Mendoza checking *Syringa vulgaris* (common lilac),
Phenophase: Breaking leaf buds Photo credit: Mary Goshorn

I think Mo Ewing's advice for those starting out (see Conservation Corner, this issue) is sound. Don't worry about not catching the first phenophases this year. Start with plants that are mature enough for you to identify this year, and report those observations. By next year, you'll know where to look for the same plant, and will be able to capture the earlier phenophases.

Phenology is also showcased in Denver Botanic Gardens new Science Pyramid to encourage awareness of how Citizen Scientists can contribute to scientific research. Come and check it out the next time you visit the Gardens. We all love to be out in nature; how much cooler is it if we can help further scientific study while doing so?!

Mary Goshorn is a research assistant in the Research and Conservation Department at Denver Botanic Gardens. She developed the Gardens Phenology Trail and oversees phenology volunteers and data sharing with partners.

New & Announcements (Cont. from page 15)

Join Plan Jeffco In Honoring the Land Trusts Conserving Jeffco's Open Spaces

Show the Jefferson County Commissioners your support of the conservation of Open Space in Jefferson County. Attend PLAN Jeffco's Annual Dinner with our County Commissioners to Celebrate 43 years of Conserving Jeffco's Open Spaces. The Honorees are Clear Creek Land Conservancy, Colorado Open Lands and Mountain Area Land Trust. Their efforts have protected over 11,000 acres in Jeffco and over 290,000 acres in Colorado. For this we all owe them a big THANK YOU.

PLAN Jeffco invites you to attend this Annual Dinner with Open Space Staff and the County Commissioners on Mon. Sept. 21, 2015, at 5:30 p.m. at The Vista at Applewood Golf Course, 14001 West 32nd Ave., Golden 80401

Tickets are \$45 and include a hors d'oeuvres reception with open bar, a buffet dinner and dessert. The menu is on their website, planjeffco.org. Purchase online at planjeffco.org or call 303-526-1348 (leave a message) to make a reservation.

PLAN Jeffco is a nonprofit citizen organization formed in 1972 to campaign for a one-half percent sales tax to purchase parklands for public benefit. It also oversees and provides input and inspiration to the Jeffco Open Space Division, which has acquired more than 53,000 acres and manages more than 42,500 acres of public land and parks. For information contact Michele Poole, PLAN Jeffco board member, ContactUs@PLAN-jeffco.org, 303-526-1348.

Wolf Creek Pass Bioblitz

On Saturday, August 22, Rocky Mountain Wild held their first Bioblitz in collaboration with San Juan Citizen's Alliance, San Luis Valley Ecosystem Council, Pagosa Great Old Broads for Wilderness, and the Colorado Native Plant Society.

The iNaturalist app was used to record occurrences of birds, mammals, insects, and plants by teams in the area.



Charlie Turner & John Bregar



Bob Powell & Charlie Turner

The botany team included CoNPS Board member, Bob Powell, CoNPS presidents, Charlie and Jan Turner, and John Bregar.

The area surveyed is heavily used by Canada lynx. A great variety of wildlife and plants can be found in the area. Rocky Mountain Wild has joined with a number of conservation organizations to conserve this area from the threat of a proposed year round resort development housing up to 8,000 people.

Photos by Jan L. Turner

Treasure Hunting in the Black Forest

by Audrey Boag

You're sure it's summer when you hear the slurry bombers coming. Such was the case as a wildfire in the ironically named Black Forest near Colorado Springs grew out of control on June 11, 2013. Among the most destructive wildfires in Colorado's history, the fire consumed 486 homes and claimed two human lives. A total of 14,280 acres of forest and meadow were affected in a mosaic of varying burn severities.

This spring I had the opportunity to see the aftermath of the fire, while participating in a survey of several rare tallgrass prairie relict plants that reflect the special biodiversity of the El Paso County-owned Pineries Open Space.

In a special collaboration among El Paso County Parks, the Colorado Native Plant Society, the Colorado Natural Heritage Program, Denver Botanic Gardens, Colorado College, and the Palmer Land Trust, ten botanists, ecologists and volunteers gathered May 15-16, 2015, in the first of two field sessions to search for *Viola pedatifida*, *Heuchera richardsonii* and *Krigia biflora*. Our hope is that the habitat containing these rare species might be protected from the heavy machinery slated for use in canopy removal and tree mastication. The second field session took place July 17-18. The results will be reported in the Fall issue of *Aquilegia*.

Although it was the area's second wettest May on record, we were fortunate to be spared from rain for most of the survey. The special mix of people made both days enjoyable, with each person bringing a unique understanding to what we were seeing and hearing. The survey's organizer, former US Forest Service Landscape Ecologist Judy von Ahlefeldt, lost her own home in the fire and gave us a detailed history of the area and the issues surrounding the plans for reclamation.



Photo by Audrey Boag

What began with a view of charred trees soon turned into a botanical and biological feast as we surveyed the natural recovery of the understory. Each sighting of the sought-after plants brought shouts of joy and some hand wringing over concern for the future. Along the way we were surprised by the many creatures who had repopulated the area so soon, including chorus frogs and an especially large Woodhouse's toad. We noted sixteen species of birds, including at least three who were nesting in the burned trees.

Enjoyable as it was to find the things both hoped for and unexpected, our foray highlighted the fragility of life at our mercy when we can't see the forest for the trees. I hope that our efforts will help to ensure the preservation of the rarities along with all of the biodiversity so essential to rebuilding a healthy forest.

The Pineries Open Space is currently closed to the public until restoration is complete and the lands are safe for access. This keeps everyone (people and the environment) safe and allows for continued uninterrupted plant growth.

A detailed report on the Black Forest survey will be available in late 2015. This was one of several projects of the CoNPS Field Studies Committee that is chaired by Steve Popovich, who helped to facilitate this project. Special thanks to El Paso County Parks for supporting this study.

Audrey Boag is a lifelong child of the woods with a passion for the behaviors, sounds and images that add to our understanding of the natural world. You can see some of her photographs at www.woodpeckeralley.com



Viola pedatifida Photo by Steve Olson



Woodhouse Toad Photo by Audrey Boag

Garden Natives

by Jim Borland

Scarlet Globemallow

Sphaeralcea coccinea

Unknown to this writer is the reason that so many flowers are known as 'scarlet', 'crimson' or 'cardinal' when to all but the blind the flower color is really orange. Such is the case with Scarlet globemallow, also known as Red falsemallow, Scarlet mallow and Red star mallow. Copper mallow, yet another common name, is, perhaps more descriptive and Cowboy's delight more fanciful and imaginative.

Regardless of its name, this mallow may be the toughest of all mallows, growing in the wheel ruts of dry, shortgrass prairie roads with its strong, deep taproot (to 8 to 13 feet deep) and its running rhizomes. Aside from roadbeds and roadsides, Scarlet mallow is found naturally in disturbed sites, on dry hills, in grasslands, on mesas and on prairie hardlands from southern British Columbia to Manitoba south to Oregon, Utah, Texas, Iowa and Arizona. Occupied soils range from light sandy or rocky to dense clays with a pH of 5 to 8.



Sphaeralcea coccinea Photo © Charlie Turner



Sphaeralcea coccinea Photo © Charlie Turner

Emerging in April to May, this 4 to 8 inch tall perennial in Colorado spreads to form extensive colonies of green to gray pubescent, deltate to suborbicular divided leaves peppered with dense clusters of salmon to orange colored flowers.

Throughout its range, the amount of natural precipitation necessary to keep it in peak form varies, depending upon locale, but many consider it to be one of the most drought resistant perennials of the Great Plains.

The greatest roadblocks to propagation are first the unavailability of seed (500,000/lb.), especially viable seed, since it is often infested by weevils. Look for a tiny, tiny hole in the seed. The second roadblock is germination that can be overcome with scarification. But, no easy or convenient means is available to accomplish this latter task on a large scale, unless you consider drilling a very small hole in the seed coat as more than one source suggests. A few growers have succeeded with rhizome cuttings in spring, but large number increases by this means are improbable. Even very young cuttings may be used for rooting, but results vary with each grower or batch of cuttings.

In the container, seedlings or larger plants present no special problems if extra attention is paid to higher levels of soil aeration than is commonly done.

Cold hardy to zone 3b (-30 to -35°F) at least, Scarlet globemallow is not a plant for confined areas. It has the ability to travel under 4 feet of concrete sidewalk, so give it plenty of room and allow it to ramble at will throughout the planting area.

Jim Borland is a well-known horticulturist and co-hosts the radio show, "Ask the Garden Pros with Jim and Keith", AM 1430 KEZW from 7-9 a.m. on Saturdays. Jim is a former President of CoNPS and has an in-depth knowledge of botany, being one of the plant identification superstars on the Colorado Native Plant Society Facebook Public Page (<https://www.facebook.com/groups/338614328016/>) where people post photos of plants and Jim and others (such as Jennifer Ackerfield) identify them.

BOOKS & MEDIA REVIEWS

The Ecology of Colorado: Landscapes, Plants and Wildlife of the Centennial State

Review by Jack Carter

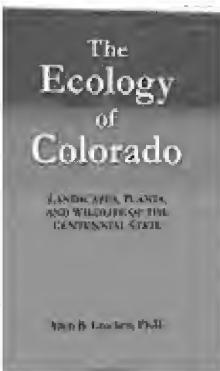
The Ecology of Colorado: Landscapes, Plants and Wildlife of the Centennial State. Allen B. Crockett. Published by the author in 2014, and updated in 2015. Printed by CreateSpace.

With the exception of several points of confusion, this is a unique book that defines Colorado biology for people of ages ranging from 18 to 80. In some ways this is very general coverage of the flora and fauna of Colorado, enjoyable reading for a wide audience, but occasionally it goes into considerable depth. Allen Crockett knows a great deal about the natural history of Colorado and he wants others to join him as he travels to the four corners of the state, learning through field experiences.

Following the first two chapters that describe the geologic history, the recognized plate tectonics regions, major topographic features, physiographic provinces and the ecoregions, the book divides this large and beautiful state into four major landscapes. The remainder of the book is divided, chapters three through eight, into detailed descriptions of the Great Plains; the Southern Rocky Mountains; and the Western Tier that here includes the Colorado Plateau and the Uinta and Wyoming basins and the middle Rocky Mountains. Each of these large ecoregions is divided again into two chapters, one chapter describing the vegetation and one describing the wildlife.

One of the most interesting additions to this publication are the personal notes distributed throughout the book and identified as From the Author. In these inserts Allen provides an aspect of the subject under consideration where there may be disagreements, personal memorable experiences, and family or friends' experiences. These bring a touch of levity one seldom finds in similar publications.

Each of the eight chapters is relatively long, and includes several photographs of related species. In some cases as many as 20 or more common names of plants are listed one after the other in a single paragraph. There are no illustrations, and perhaps only three or four may be pictured. If one is interested in the scientific name of a plant species they must turn to the back of the book where all the plants named throughout the book are listed in alphabetic order by common name. Also, if they are interested in whether a plant species occurs in the montane or on the tundra, and they refer to the listing of the plant names in the back of the book, there are no page num-



bers given that will locate the plant in the book. It was difficult to understand why the scientific names of all the plants and animals were not listed in parenthesis following the common names in the text and omit the list. Finally the most limiting aspect of the book is the absence of an index.

As I continued to study this book, which contains so much valuable information, I literally tripped over what I think is responsible for some of these shortcomings. In rereading the acknowledgements, there were some critical people that did not join Allen in preparing his manuscript. Based on my experience I can say he needed the assistance of a layout person, illustrators, additional photographers, and several friends with different backgrounds, to proofread each chapter several times from different perspectives. I can truthfully say that in producing similar publications I relied heavily on so many friends that made it all possible. We biologists know a great deal about the natural world, but we need considerable assistance in making this information available to the larger society. I thoughtfully make these suggestions, recognizing how important this book is in reaching the potential audience, and improving their understanding of the natural history of Colorado.

As I read each chapter I recognized there is a world of study that demands the attention of future biologists. From the perspective of the science of ecology, including climatology, soil science, energy flow, species diversity, carrying capacity, limnology, conservation, etc., there is so much we do not know, and so many unanswered questions. As we study this important publication we are left with the question Garrett Harden made famous, "And then what?" Where shall we start?

Jack Carter
apacheplume29@gmail.com

Jack Carter is Professor Emeritus, Colorado College, and the author of *Trees and Shrubs of Colorado*, *Trees and Shrubs of New Mexico*, and *Common Southwestern Native Plants: An Identification Guide*.

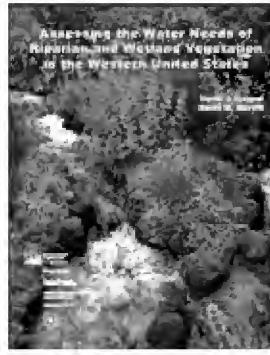
Assessing the Water Needs of Riparian and Wetland Vegetation in the Western United States

Review by Jim Borland

Assessing the Water Needs of Riparian and Wetland Vegetation in the Western United States. David J. Cooper and David M. Merritt. 2012. General Technical Report RMRS-GTR-282. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Station. 125 p.

From the cover photo of a mountain stream festooned with two species of Monkeyflower, Indian paintbrush and False heliobore to the last 7 1/2 pages of cited literature, this publication is a reservoir of information about the wetlands and riparian ecosystems of eleven western states.

If you have ever wondered what constitutes a fen, wet meadow, marsh, salt flat or riparian area and how water and topography creates them, then this publication is for you. Only about 1.5% of Colorado is designated as wetland or riparian and these areas are the most ecologically and economically significant ecosystems in the state, supporting at least 1,400 associated plant species.



One chapter is devoted to the hydrologic regime for each of the wetland types and another describes how plants use water and when they use it; and what happens when water availability is disrupted or over supplied. Measuring all this can get complicated but two chapters discuss in detail the methods and procedures used. Expect to learn how pressure bombs, piezometers, milivoltmeters, continuous loggers, theodolites and porometers are used to measure water and water relations on and in the land and in the plant. Redox potential, nitrates, manganese and sulfates are also often measured to understand how water moves through the soil.

I found it interesting that determining the true age of a tree is not accomplished by coring the tree at 4.5 feet above the ground as is standard in forestry, but by digging down to the point where a core or cut reveals the exact point where wood is found all the way to the center on one side of the core or cut and pith at the center on the other side. Roots have no pith at their centers; growth above the germination point, root crown or root collar do.

The book concludes with four case studies, three in Colorado (Mt. Emmons iron fen, South Platte Park and Great Sand Dunes National Park). Of particular interest to this reviewer is the case study of Mt. Emmons iron fen located just west of Crested Butte where I participated in the first monitoring study of the rare carnivorous plant, *Drosera rotundifolia*. The 15 acre fen here contains a 1.5 acre pond stunningly jewel-like in its location and stony stillness. Photographers and artists take note.

This is a stand-alone reference deserving a place in every personal library of those who have 'til now avoided wet places when enjoying native plants.

This publication can be downloaded at: http://www.fs.fed.us/rm/pubs/rmrs_gtr282.pdf

Dragonflies of the Colorado Front Range

Review by Ruth Carol Cushman

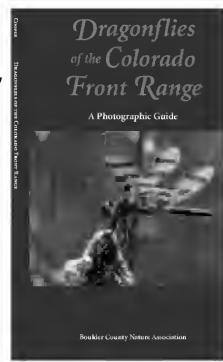
Dragonflies of the Colorado Front Range by Ann Cooper.

Boulder County Nature Center, 2014. 111 p.

If you've ever admired a jewel-like dragonfly and wondered what kind it was, then Ann Cooper's *Dragonflies of the Colorado Front Range* is the book for you. More than 70 species of Odonata (the order that includes both dragonflies and damselflies) are shown in dazzling color photographs

taken by the author and other local naturalists. A description of each species includes habitat, appearance, size, behavior, look-alikes, and flight season.

Don't skip the introduction as readers so often do. Illustrated by Amy Chu, it includes fascinating general information, such as the unique mating positions of Odonata, as well as tips on watching and photographing these insects that dash and dart about with amazing rapidity. A key to the broad groups of Odonata helps determine whether you are watching a darner or a dancer, a clubtail or a forktail.



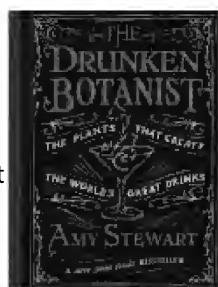
The small paperback is easy to use and also easy to take into the field to help with identification of these insects that may even change color depending on temperature and time of day. I own a guide to dragonflies and damselflies of the west that weighs almost 2½ pounds. It's comprehensive, packed with information, but I rarely use it whereas Ann Cooper's guide is beginning to look dog-eared. The big advantage of the smaller book is that it's limited to the Front Range so it features the species we actually see in Boulder County.

Take the book out to Walden Ponds along with a pair of close-focusing binoculars on a hot summer afternoon. (Odonata are most active during hot weather.) As Ann Cooper writes, "Dragonflies are the very essence of summer." You will be amazed at how much having the book in hand will focus your attention and help you become familiar with these jewels that fly.

The Drunken Botanist

Review by Jan Turner

The Drunken Botanist: The Plants that Create the World's Great Drinks by Amy Stewart. Algonquin Books of Chapel Hill, 2013.



What a fun, interesting book! The first part of the book is an alphabetical listing of plants commonly used to make alcohol. Historical information about the plants, alcohol and non-alcohol related, will delight readers. For example, rye may be infected with the fungus ergot, which is toxic to humans and contains a precursor to LSD that is retained even after the rye is made into beer or bread. It can cause mania, making the people consuming the food or drink to go crazy. Some historians speculate the mania from ergot may have been responsible for women being accused of witchcraft in Salem. Another section of the book discusses herbs and seasonings used in drinks.

Megan Bowes of Boulder has been leading yearly evening field trips celebrating the book, *The Drunken Botanist*.

Cartoonist Rob Pudim has celebrated Megan's field trips in *Botanicum Absurdicum* on page 2.

Colorado Native Plant Society Membership Form

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If this a change in address, please write your old address here.

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Most members receive the *Aquilegia* newsletter electronically.

Check the box if you would like to receive the printed copy of *Aquilegia*.

Please make check payable to: Colorado Native Plant Society

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DUES include newsletter *Aquilegia* published quarterly.
Membership dues cover a 12-month period

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CONTRIBUTIONS to CoNPS are tax deductible

John Marr fund for research on the biology and natural history of Colorado native plants \$ _____

Myrna P. Steinkamp Memorial fund for research and other activities to benefit the rare plants of Colorado \$ _____

Send completed form and full remittance to:

CoNPS Office
PO Box 200
Fort Collins, CO 80522

Check box to receive information on volunteer opportunities

CoNPS CALENDAR

AUGUST 2015

Aug. 27 South Boulder Creek Floodplain Field Trip (B)

SEPTEMBER 2015

Sept 9 Cathy Fromme Prairie (West) Hike (N)

Sept 11-13 Native Plants & Pollinators, CoNPS Annual Conference & Annual Colorado Rare Plant Symposium, American Mountaineering Center, Golden, CO

Sept 19 CoNPS & Front Range Wild Ones Annual Seed Swap and Plant Sale, Butterfly Pavilion, Broomfield, CO

Sept. 19 High Plains Environmental Center Plant Sale, Loveland

Sept 26 Hugh's Cabin Barbecue and Hike, Poudre Canyon (N)

OCTOBER 2015

Oct 4 Castlewood Canyon State Park Hike (MD)

Oct 17 Landscaping with Native Plants Workshop, Pueblo

Oct. 24 CoNPS Board Meeting, Regis University Library

NOVEMBER 2015

Nov. 5 CoNPS Board Meeting, Regis University Library

KEY

B	Boulder Chapter
GR	Gore Range Chapter
MD	Metro-Denver Chapter
N	Northern Chapter
P	Plateau Chapter
SE	Southeast Chapter
SJ	San Juan/Four Corners Native Plant Society

Workshop

Landscaping with Native Plants Workshop

October 17 in Pueblo, CO

Instructor: Jim Tolstrup

More details coming soon.

Field Trip: Boulder Open Space Mountain Parks

South Boulder Creek Floodplain Field Trip

August 27, 2015 5:30 pm – 7:30 pm

Thursday, August 27; 5:30pm until dusk

Leader: Lynn Riedel

OSMP Plant Ecologist Lynn Riedel and Colorado Department of Transportation biologists will take us on a trip to the newly purchased Granite property to explore a recent wetland creation. This site was used to mitigate destruction of habitat for the Ute ladies'-tresses orchid and the Preble's Meadow Jumping Mouse by the US 36 construction project. We will learn more about the important habitat provided for these federally listed species along the South Boulder Creek corridor, and how this restoration was designed to create habitat for both the orchid and the mouse.

Meet: East Boulder Recreational Center parking lot (5660 Sioux Dr.), NE corner.

For more information or to register: Megan Bowes, bowesm@bouldercolorado.gov or call 303-561-4883.



Colorado Native Plant Society

P.O. Box 200

Fort Collins, Colorado 80522

<http://www.conps.org>

CoNPS 2015 Annual Conference

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September
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